

**COMPUTER SCIENCE TRIPOS Part IB – 2012 – Paper 4**

**4 Computer Graphics and Image Processing (PR)**

- (a) Describe how transform coding can be used to compress image data. [4 marks]
- (b) Explain the Walsh-Hadamard transform on a one-dimensional array of 4 greyscale values. [4 marks]
- (c) Extend this to the Walsh transform for a two-dimensional array of  $2 \times 2$  greyscale values. [4 marks]
- (d) Develop an analogous transform for a three-dimensional array of  $2 \times 2 \times 2$  greyscale values. [8 marks]

Include sufficient algebra in your answers to allow a competent programmer to implement the algorithm.